

CLAIMS

1. (Amended) A barcode recognition apparatus comprising:
  - preprocessing means for determining an edge portion of an input image and transforming the edge portion into a histogram of brightness;
  - binarization process means for binarizing the preprocessed input image;
  - labeling means for labeling the binarized input image;
  - barcode field extracting means for extracting a barcode field from the labeled input image; and
  - barcode recognizing means for recognizing a barcode from the extracted barcode field.
2. (Amended) The barcode recognition apparatus according to claim 1, wherein the binarization process means determines a threshold value in the binarization of the image on the basis of the input image transformed into the histogram.
3. (Amended) The barcode recognition apparatus according to claim 1 or 2, wherein the binarization process means employs a discriminant analysis method as a method for determining a threshold value in the binarization of an image.
4. (Amended) The barcode recognition apparatus according to any one of claims 1 to 3, wherein the labeling means performs labeling by allocating individual numerical value names to each of patterns that are connected to the input image.
5. (Amended) The barcode recognition apparatus according to claim 4, wherein the width of a bar is defined in the number of black pixels/the height in the vertical direction regarding the labels of the bar from the input image labeled by the labeling means.
6. (Deleted)
7. (Deleted)
8. (Deleted)
9. (Deleted)

10. (Deleted)

11. (Deleted)

12. (Amended) A barcode recognition method comprising the steps of:

determining an edge portion of an input image and transforming only the edge portion into a histogram of brightness;

binarizing the preprocessed input image;

labeling the binarized input image;

extracting a barcode field from the labeled input image; and  
recognizing a barcode from the extracted barcode field.

13. (Amended) A program for enabling a computer to perform:

a preprocessing step for determining an edge portion of an input image and transforming only the edge portion into a histogram of brightness;

a binarization process step for binarizing the preprocessed input image;

a labeling step for labeling the binarized input image;

a barcode field extracting step for extracting a barcode field from the labeled input image; and

a barcode recognizing step for recognizing a barcode from the extracted barcode field.

14. A recording medium readable via a computer, wherein the program according to claim 13 is recorded.

15. (Added) A barcode recognition apparatus comprising:

preprocessing means for determining an edge portion of an input image photographed via a camera and transforming the edge portion into a histogram of brightness;

binarization process means for binarizing the preprocessed input image;

labeling means for labeling the binarized input image;

barcode field extracting means for extracting a barcode field from the labeled input image; and

barcode recognizing means for recognizing a barcode from the extracted barcode field, wherein

as a condition of the adjacency of bars in the barcode, a relative value with

respect to the widths of the bars is determined to be a threshold value.

16. (Added) The barcode recognition apparatus according to claim 15, wherein when the widths of the bars or spaces are collated, an allowable range is set in accordance with the widths.

17. (Added) The barcode recognition apparatus according to any one of claims 1 to 5, 15, or 16, wherein the barcode field extracting means extracts the adjacency relationship of the bars, determines a left end and a right end of the bars in accordance with the adjacency relationship, and extracts a barcode field through the correspondence of the number of bars between the left end and the right end of the bars to a certain value that has been prescribed.

18. (Added) The barcode recognition apparatus according to claim 17, wherein the adjacency relationship of the bars is determined to be adjacent when all of the conditions that two bars share a scanning line, that the difference of the heights between the two bars is within a certain range, and that the distance between the two bars is within a certain range, are satisfied, and wherein, the range of the difference of the bar heights and the range of the distance of the bars are obtained on the basis of relative values with respect to the height and the width of a bar used as a criterion.

19. (Added) The barcode recognition apparatus according to claim 17 or 18, wherein barcode recognition employs the minimum width of the bars in the barcode field as a unit width, the barcode field being extracted via the barcode field extracting means, and wherein the barcode recognition is performed by collating the arrangement of the pattern of the widths of bars and spaces in the extracted barcode field, the widths being integral multiples of the unit width, with a prescribed arrangement of the pattern of the widths of bars and spaces.

20. (Added) The barcode recognition apparatus according to claim 19, wherein the barcode recognition is repeated varying the unit width.

21. (Added) A mobile phone comprising the barcode recognition apparatus according to any one of claims 1 to 5 and 15 to 20.

22. (Added) A mobile phone comprising:

- an antenna for transmitting and receiving radio waves;
- a first control portion for controlling the transmission and reception of radio communication;
- a key input portion;
- a display portion;
- a camera for inputting image information; and
- a second control portion having a barcode recognition apparatus.

23. (Added) The mobile phone according to claim 22, wherein the barcode recognition apparatus comprises:

- preprocessing means for determining an edge portion of an input image photographed via the camera and transforming only the edge portion into a histogram of brightness;

- binarization process means for binarizing the preprocessed input image;

- labeling means for labeling the binarized input image;

- barcode field extracting means for extracting a barcode field from the labeled input image; and

- barcode recognizing means for recognizing a barcode from the extracted barcode field.

24. (Added) A barcode recognition method using the mobile phone according to claim 22 or 23, comprising a step for displaying input image information on the display portion when the barcode is photographed to be the input image via the camera.